The Effects of Recent Volatility in International Petroleum Markets on Canadian Wholesale and Retail Gasoline Prices

A report prepared for the Competition Bureau

by

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EXECUTIVE SUMMARY

This is a report written as part of an examination by the Competition Bureau into two sets of complaints. Consumers were concerned by high retail prices, and a number of operators of gasoline outlets were upset by the low margins that they could earn on gasoline sales in the Greater Toronto Area (GTA) and in Ottawa/Hull. The focus of this report has been to try to understand the reasons for these phenomena. In particular, could they be best understood as the result of the operation of normal market forces, or were there reasons to believe that they were the product of anti-competitive acts against which the Competition Bureau would have the authority to take action.

As part of its investigation the Competition Bureau made a number of information requests to all the principal petroleum companies and to a number of importers and major marketers of gasoline. The information was sought on a voluntary basis and the companies were assured that the material that they provided would be treated as confidential. There were several points in this report when it was necessary to draw on confidential information. As a result, two reports have been prepared, one that is confidential and intended solely for the eyes of the personnel of the Competition Bureau, and a second report that deletes the confidential material but draws on the conclusions derived from it.

For the most part the companies have been very cooperative. Detailed information on pricing in the GTA and in Ottawa/Hull was particularly helpful. Alternative public sources would not have provided the same detailed and accurate coverage. Where it was considered necessary, meetings were held with companies where the information provided by them was discussed.

There is much public information available on the petroleum industry. A number of companies provide it on a commercial basis. In addition it is a much-studied industry and there are a number of reports in Canada and the U.S. dealing with earlier spikes in prices. These have invariably found that the spikes in question were the result of factors that affected demand or, more often, supply, and were not the result of anti-competitive activities. These reports and more general studies of the industry have been consulted. Another important source of information drawn on is the reports of the companies to their shareholders and to regulatory agencies such as the Securities and Exchange Commission in the U.S. When read over several years they provide considerable information. Fortunately many of the important participants in the industry are public companies.

The report focuses on petroleum refining and the retailing of gasoline. Crude oil prices are not, and cannot be in issue since prices are determined internationally.

Crude oil is converted into petroleum products at refineries, which are highly automated chemical complexes. In the case of gasoline, it is either transported to a terminal for later local delivery, or it is picked up for local delivery by a tanker truck. The reach of refineries depends on the transportation arteries available to them. In the Atlantic Provinces the principal mode of transportation is by water. In other areas, it is pipeline, supplemented by rail transport. The difference between the cost of crude oil and what refiners receive for the product is the refiners' margin. It is required to cover the costs at the refinery, the transportation cost to terminals, and the storage cost at refineries and terminals.

Based on average refinery and retail margins in Ontario in 2003[1] and current values (October 2004) for crude oil and the Canadian dollar the current price of gasoline would be 85.3 cent/L, which is probably somewhat above the average price in Ottawa. Thus by now, after the industry has adjusted to the shocks of escalating prices for crude oil, the increase in price is all due to the increase in the cost of crude oil. Breaking down the retail price into its component parts based on the foregoing assumptions, the

[1] Suncor's figures from its annual report are used for this purpose.

percentage division is: crude oil – 49.9, taxes – 35.5, refining margin – 7.62 and retail margin – 7.74. At prices below 85.3 cents/L at the time of this writing, either refining margin or retail margin would be lower. Obviously a different division would result at a lower price for crude oil. In 2003, the relative importance of taxes and crude oil were reversed; at $30 U.S. a barrel as opposed to the recent $53 U.S. per barrel, oil accounted for 38.3 percent and taxes for 42.6 percent.

The price spike in May 2004 was only partly the product of an increase in crude oil prices. A significant component of the increase was also due to a large increase in the refining margin in the U.S. With regard to any significant movement in wholesale prices, the Canadian and U.S. refining industries can be considered to be in the same regional markets. During a short time in May the U.S. refining margin reached a level that was about four times higher than the rather low margin at that time in 2003. Since May, margins in the U.S. have gradually come down and the Canadian dollar has increased in value, which explains why Canadian prices are similar to what could be expected at average margins in 2003. Thus the price spike that saw retail prices flirting with a dollar a litre was the product of increases in the price of crude oil and a large increase in wholesale refining margins on both sides of the U.S. border. The increase in Canadian refining margins was in keeping with the historical relationship with U.S. margins.

A number of factors were responsible for the increase in refining margins for gasoline. The most important from a long-range viewpoint is the balance of capacity to demand. At present levels of demand, refiners are operating close to capacity. Minor shocks, such as a shutdown of some refinery capacity for unscheduled maintenance, or unanticipated increases in demand, result in a temporary shortfall in supply leading to higher prices. For the present it appears that there are international supplies to meet shortfalls as long as there is adequate notice that the supplies will be required. Save for two refineries in Atlantic Canada primarily dedicated to exports to the U.S., there was as usual a minimal amount of exporting and importing by Canadian refineries. Exports were not a factor in the increase in retail prices.

The prospects for the building of new refineries in the U.S. or Canada are poor. Economic entry barriers into the industry are high, and there are additional impediments in the form of environmental regulations and uncertainty about the course of future demand. In the past, high crude oil prices have resulted in declines in demand as more energy efficient equipment and other energy saving steps were put into place.

As a general matter tighter refinery supplies are not a friendly environment for independent retailers. In some areas it is cost efficient for independent retailers to purchase supplies in the U.S. in truckload quantities, but this is not generally practical nor even a partial solution for large chains of outlets; they must have assured, contractual sources of supply and thus must rely on domestic refiners. The domestic supply situation will soon undergo some deterioration when Petro-Canada's Oakville refinery is closed at the end of the year. It appears to have been the victim of the high cost of meeting environmental regulations with regard to sulphur levels in gasoline and diesel. Only some of the supply lost will be made up through the expansion of Petro-Canada's Montreal refinery.

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INTRODUCTION

This is a report written as part of an assignment that I undertook with the Competition Bureau starting in early June to participate in its examination of the source of high retail prices and, seemingly paradoxically, low retail margins. This examination was commenced May 4 and announced on the Bureau web site. It was undertaken in response to a large number of complaints by consumers and independent retailers regarding retail gasoline prices. The consumers were concerned by the large run-up in prices and the retailers, particularly those in the Greater Toronto Area (GTA) and the National Capital Region (NCR), by the compression in their margins. The focus of my efforts was to understand the sources of these concerns; more particularly, to investigate whether the changes taking place were the result of normal market forces or *illegal or otherwise anti-competitive actions* taken within the Canadian industry to take advantage of the volatility in international crude oil and wholesale gasoline markets. Where appropriate, the possibility of illegal conspiracies or Abuse-of-Dominant-Position are also addressed in other contexts. I was also specifically charged with providing sufficient background on the structure, conduct and performance of the industry in order to make intelligible any conclusions that I might draw.

The petroleum industry is much studied and is almost constantly under review in the U.S. at one level or another. There is a ready market for information on the industry and a number of companies specialize in the collection of information on prices (and volumes) for all types of crude oil, quoted wholesale prices at locations throughout the world, and for retail prices and market shares in local markets. The demand for this information emanates primarily from participants in the industry. They need the information for their operations and planning. Government departments with the responsibility for monitoring and understanding events in the industry are other consumers of some of this information. Although quoted wholesale prices are different than transaction prices because of discounts, the general level of discounts is known to industry participants and is fairly readily available to government departments when the need arises. In other words, this is a highly transparent industry. There is never any problem about knowing what is happening in the industry at all levels. What is less apparent is why certain changes are occurring. This is similar to other industries, with the exception that it is rare to be able to closely trace the relationship between the price of a raw material and that of consumer products as is the case with crude oil and gasoline, diesel and heating oil.

Although a considerable amount of data is available, the voluntary cooperation of all the principal refining and marketing companies was elicited to obtain additional information related to the specific complaints under investigation. There was a high degree of cooperation. In addition to asking the major oil companies for their explanation of the sharp increase in retail prices, they were asked to provide specific information on: wholesale and retail prices in the GTA and the NCR; all agreements relating to the purchase, sale or exchange of products or services; and the matters discussed at association and like meetings. In addition, importers and wholesalers were asked about their activities and their reading of the import situation in the context of a high degree of capacity utilization in North America and Europe. A number of large retailers were also approached, in particular those retailers who were important marketers in other areas, such as Walmart, Loblaws, Costco and Canadian Tire. All, save for the latter, were recent entrants and are perceived as a new and dynamic force in retail gasoline markets. The retail price information obtained from some market participants was an important addition to that collected by the firms specialized in information gathering. In volatile markets retail prices tend to change often,

sometimes upwards of 25 times a week and sampling by commercial firms may miss important changes.[2] The discount structure for wholesale prices, provided by some companies, was also important where it was necessary to have an appreciation of transaction prices. In all cases public sources of information, principally annual and quarterly reports and information on wholesale prices were consulted and were helpful in providing background, in formulating questions, and initiating dialogue in the interviews that were conducted with the firms asked to provide information.

As mentioned earlier, this is a much-studied industry. In Canada the most recent effort was the Report of the Standing Committee on Industry, Science and Technology, *Gasoline Prices in Canada*, (House of Commons, Canada, November 2003) The Committee was investigating " the causes of the recent increase in the price of gasoline" and the negative effects said increase was having on the economy. After examining price information at all levels of the industry, the structure, performance and profitability of the downstream sector the Committee found that normal market forces were at work and explained the price increase. It did, however, recommend that a Petroleum Monitoring Agency, with a three year mandate, be set up that would report to Parliament. The Canadian Alliance Members of the Committee dissented. Currently, the principal source of information that is provided in an organized way[3] is a bi-weekly report, Fuel Facts, provided by MJ Ervin and Associates and Purvin & Gertz Inc. that is presented to the public by the Canadian Petroleum Producers Institute.

The Committee and the Competition Bureau were able to draw on a report by the Conference Board of Canada, *The Final Fifteen Feet of Hose: The Canadian Gasoline Industry in the Year 2000*. This is an ambitious effort that dealt with the industry from crude to retail. As well as providing considerable descriptive material, the report conducted a number of statistical tests. Its principal conclusions from the viewpoint of present concerns are that: Canadians enjoy some of the lowest gasoline prices in the world and the increase in retail prices occurring at the time were the result of increases in crude oil prices. Partly because of different mandates, but also because of my professional concerns over several decades, the material in this report differs considerably from that in Fifteen Feet of Hose. There is a greater emphasis on wholesale prices and a more detailed investigation of likely manifestations of market power in the present report.

There are numerous studies and commentaries by the U.S. Energy Information Administration and committees of the U.S. Congress on the causes of changes of retail prices. Of course crude prices are always traced as an important element, although usually with some lag. What has been different about recent increases in retail prices has been the role that larger refinery margins have played. As a general matter, over the years Canadian refiners have shared in the ups and downs of the U.S. industry since it has been demonstrated repeatedly that wholesale prices in the larger Canadian centres such as Montreal, Toronto and Vancouver do not differ markedly from wholesale prices in relevant comparison points in the U.S. and closely track changes in prices at those U.S. locations. One of the simpler, albeit critical, elements of this report has been to investigate whether the wholesale price differences between key U.S. and Canadian centres widened during the period of concern. A widening would not necessarily demonstrate a departure from normal market forces, but it would indicate that conditions in the Canadian

[2] In the U.S. Oil Price Information Service avoids the sampling problem by purchasing data from a fleet card provider to obtain both retail and wholesale prices.

[3] As mentioned earlier in the text, data can be purchased from firms such as Bloomberg or Reuters, but the information that they provide is in raw form.

industry made consumers highly vulnerable to shocks to the international system and would invite further investigation of the structure and conduct of the industry.

This report is divided into several sections. The first deals with the structure and economics of petroleum refining. Although public attention tends quite naturally to concentrate on pricing at the retail level, to the extent that competition issues exist, they are usually embedded in the refining sector where the number of suppliers are fewer and entry conditions are much more difficult. Included in this section is a discussion of the various agreements among refiners and other suppliers relating to reciprocal supply agreements and the sharing or purchase of terminal services. The second section deals with pricing at the wholesale level, beginning with the run-up in prices in the U.S. and with the reasons that have been put forward to explain the increase in refinery margins. Although the by now traditional interest in comparing quoted prices in several cities with relevant points in the U.S. is pursued, considerable attention is devoted to price comparisons of points within Canada. To this end, there are separate sub-sections devoted to pricing in Eastern and Central Canada, and Western Canada.

It is unnecessary to have a separate section on crude oil since the principal facts regarding crude oil are well known and non controversial. Apart from the brief discussion below, further discussion of crude oil is deferred until the section on refining. For present purposes it is sufficient to acknowledge the following: crude oil is an internationally traded commodity over which domestic suppliers and buyers have no control; Canada is a net importer in the east and is a major exporter in the west; [4] its price is at least partially under the control of OPEC, but it is subject to shocks precipitated by political events. Finally, the use of the singular when referring to crude oil is only a convenience; there is a great variety of oils with varying properties.

Wherever possible the descriptive material in this report relies on public sources. Annual and quarterly reports by companies and industry publications provide a fairly well rounded picture of the industry. Although not all companies are publicly traded entities, fortunately this is not the case for the three national companies: Imperial, Petro-Canada and Shell. The reports of Suncor and Canadian Tire also proved very valuable.

PETROLEUM REFINING

Refinery Output. There are currently 17 operating refineries in Canada capable of producing a full range of products including gasoline.[5] This number will shortly be reduced to 16 when Petro-Canada completes its plans to close its Oakville refinery by the end of 2004. These refineries, shown in Table 1, transform a variety of crude oils and other hydrocarbons[6] to a number of products ranging from very light products (with a low specific gravity) such as butane and propane to heavy fuel oil, and specialty products such as lubricating oil. Although public attention tends to focus on gasoline, all products are important to the

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[4] The National Energy Board monitors energy markets, including those for crude oil, to ensure that domestic buyers have access to supplies on similar terms and conditions as export buyers. (Annual Report 2003, p. 45)

[5] The small Parkland refinery, designed to convert natural gas condensates to gasoline, has not been operating since the end of September 2001. The cost of condensates relative to gasoline made the operation unprofitable.

[6] The inputs used in refining include partially finished materials from refining that are traded among refiners and other hydrocarbons such as natural gas and natural gas liquids. In 2003, 9.5 percent of the inputs of Canadian refiners were other than crude oil. (Statistics Canada, *Refined Petroleum Products*, February 2004)

economic well being of refiners. On a revenue-per-litre basis the experience of Petro-Canada in 2003 is probably typical, with gasoline, distillates (probably diesel, light fuel oil and jet fuel) and "other" returning 39.6 cents, 36.9 cents and 43.5 cents, respectively.[7] The higher return from "other" is probably due to lubricating oil being one of its components. But while all products are important contributors to refiners' revenues on a per-unit basis, gasoline is by far the most important single product, contributing 45.7 percent of Petro-Canada's revenue in 2003. This experience is mirrored by the national statistics. In 2003, gasoline output in Canada was about 42 percent, followed by diesel at almost 25 percent. Light fuel oil, which is virtually identical to diesel save for sulphur content, and heavy fuel oil each account for approximately eight percent.[8]

Refinery Processes. Refineries are highly automated chemical complexes that convert crude oil into a number of products. They contain a variety of equipment and processes designed to meet the needs of the marketplace, and in more recent years to deal with the changing characteristics of supplies of crude oil and increasingly stringent environmental requirements. The first and oldest stage of the process consists of the distillation of crude oil, which permits the division of the oil into a range of light and heavy products with different boiling points. No further processing would be required if demand closely matched the outputs from the crude tower. Even without further conversion capability it is possible to make some adjustment to meet varying demand through the use of different crude oils; lighter oils provide more gasoline and heavy oils tilt output more toward distillates and heavy fuel oil. However, there has been declining demand for the heavier ends from the distillation tower relative to that for diesel, and particularly gasoline.

To better meet demand and to deal with increasingly heavier supplies of crude oil refiners use thermal and chemical processes to break down heavier molecules. The heavier ends in most refineries in Canada (and elsewhere) are processed further in a second distillation tower that operates in a vacuum and thus requires less heat than would otherwise be required to break down the heavier molecules. A further conversion of heavier ends is effected in catalytic crackers, which were first introduced in the U.S. specifically to increase the amount of gasoline that could be obtained from crude oil. Cokers and visbreakers, which rely on heat rather than combined heat and catalysts, are another means of breaking down heavier molecules to obtain desired lighter products. Cokers are found primarily in the U.S. and visbreakers, which are used to increase the yield of diesel, in Europe.

The regional distribution of visbreaking capacity in Canada is illustrative of the response of supply to demand, and therefore to prices. As part of placing gasoline in the broader context of other refinery products, average rack prices of regular gasoline and diesel were compared for Saint John, Montreal, Toronto, Edmonton and Vancouver from June 1990 to June 2004. Proceeding from east to west, the difference in average prices are: 0.26 cents/L, 0.11cents/L, 0.53 cents/L, 1.43 cents/L and 2.07 cents/L, respectively in favour of gasoline. (source: Bloomberg Oil Buyers' Guide) As might be expected with the small differences in the eastern part of the country, sometimes the price of gasoline exceeds that of diesel and sometimes the reverse is true, depending in part on seasonal factors. Given that visbreaking technology is used to increase diesel yields, it is to be expected that investments in this process would be less profitable (or unprofitable in the west). In fact, there are no visbreakers shown in the equipment

[7] *Petro-Canada 2003 Statistical Supplement*, March 2004, p. 38. It is recognized that there are different degrees of vertical integration that affect per-unit revenues, but this consideration does not negate the general point.
[8] Statistics Canada, Refined Petroleum Products, February 2004.

listed for western refineries, while five of the nine refineries in the rest of the country have such equipment.[9]

As refineries have become larger, with a broader range of conversion equipment, they allow for greater flexibility in the type of crude oils and other partially refined materials used. Valero, Ultramar's parent company, provides a good example of the flexibility afforded by various conversion capacities and using different combinations of inputs to change the output mix. In its U.S. Gulf Coast refineries it used 10 percent residual fuel oil and 18 percent other feedstocks and blendstocks along with primarily sour (heavy and high sulphur) crude oil to obtain 53 percent gasoline and 27 percent distillates. On the West Coast it used 30 percent feedstocks along with sour crude to obtain 64 percent gasoline and 19 percent distillates. In the Ultramar refinery and a refinery in New Jersey it used only 7 percent feedstocks and blendstocks with a high percentage of sweet crude oil to produce 42 percent gasoline and 40 percent distillates. Valero and Canadian refiners are able to take advantage of changes in relative values between light and heavy crude oils, the cost of partially finished materials from the refining processes, and the price of gasoline and diesel in arriving at optimal results.

A brief digression on synthetic crude oil and refining capacity is in order at this point. Synthetic crude oil is the product of an upgrading process of bitumen, a viscous hydrocarbon that needs treatment before it can be processed in a refinery. Suncor's upgrading facility allows it to produce various ranges of sour or sweet synthetic oil or diesel depending on the profitability of extracting sulphur and/or of converting part of the oil to diesel. Thus, although its upgrading facilities are not classified among the refineries, they do contribute to the supply of diesel. Furthermore, further tar sand expansion is likely to be an important element in the production of middle distillates. As noted by Suncor, " Margins for diesel fuel are typically higher than the margins for synthetic and conventional crude oil. The above noted expansion [of tar sands projects] plans of Suncor's competitors could result in an increase in the supply of diesel fuel and weaken margins."[10] Of course such developments would put additional pressure on Western refiners to skew their output even more towards gasoline.

Octane and the Environment. Once the desired product mix has been achieved in a refinery it is necessary to ensure that it has the desired properties. The most important of these relate to the removal of elements in crude oil that are considered contaminants, primarily sulphur. Removal of the latter is done through units called hydrotreaters. Other processes, such as reforming, alkylation and isomerization are used to combine and rearrange atoms. The products of these specific processes are used for blending with light streams from other parts of the refinery to produce gasoline with required octane ratings. Constituent elements of gasoline are available on the market and form an important part of imports that add to gasoline supply in the U.S and also provide Canadian refiners with access to import options in creating gasoline with desirable octane ratings.

Adequate octane has become an issue in recent months as refiners have decided to voluntarily discontinue the use of the additive methylcyclopentadienyl manganese tricarbonyl (MMT) as an octane enhancer.[11]

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[9] "2000 Worldwide Refining Survey", *Oil and Gas Journal* (December 18, 2000)

[10] Suncor Energy Inc. *Annual Information Form*, February 26, 2004, p. 2.

[11] Automobile manufacturers have long claimed that MMT adversely affects the effectiveness of exhaust controls and environmentalists oppose its use on the grounds that it results in the release of manganese into the environment.

Other available means of boosting the octane content of gasoline either require the addition of various oxygenates such as methyl tertiary-butyl ether (MTBE) or ethanol, or through further refining using the processes mentioned above. Ethanol is used as a blend by Sunoco and by some retailers. According to a report prepared for Environment Canada, MTBE was less than two percent of the Canadian gasoline pool in 2000, having fallen from 10 percent in 1998. A number of refiners and marketers had reported using it but only the two major exporting refineries, Irving and North Atlantic Refining companies, stated that they would continue to use it after 2001. However, the Newfoundland-based refinery was the only one that intended its use for the domestic market. MTBE had been in wide use in the U.S. but it has been found to be present in some groundwater supplies and its continued use is in doubt.

Under the U.S, Clean Energy Act nine metropolitan areas subject to severe smog problems were identified as requiring the use of Reformulated Gasoline (RFG). The principle difference between RFG and regular gas is the addition of oxygenates such as MTBE or ethanol that result in more complete combustion and less smog-causing material such as carbon monoxide and ozone from the exhaust system. States could also opt into the program. However, under the program, it is results that count, and different formulations of gasoline are allowed as long as the seasonal performance requirements are met. According to the most widely quoted figure, there are currently 18 separate gasolines sold in the U.S. As will be discussed subsequently, the proliferation of "boutique gasolines", as the different formulations are referred to, is considered by some to be one of the sources of increased volatility of gasoline prices in the U.S., and consequently in Canada due to the fact that Wholesale prices in Canada cannot diverge to any considerable extent from those in the U.S. There is a free flow of gasoline (and other refined petroleum products) and refiners or non-integrated petroleum marketing firms are able to take advantage of price differentials that exceed the cost of transportation and ancillary costs to ship gasoline from the lower-priced to the higher-priced areas, or for cargoes from Europe or the Caribbean to be diverted to the higher priced markets.

Refinery Capacities and Rates of Utilization. The location and capacities of the 17 refineries in Canada referred to earlier are listed in Table 1. Capacities are measured in terms of the capacity of the distillation towers. But the average output of refineries is lighter than the crude oil and other hydrocarbon inputs, and thus the yield in volume terms is higher than the volume of material used. In 2003 the volume of output of Canadian refineries was about 4.5 percent greater than the volume of inputs. (Source: Statistics Canada, Refined Petroleum Products)

It is unlikely that all of the companies use the same basis of reporting. For those companies for which there is no public information regarding the basis that is used in reporting capacities it is assumed that the capacities reported by the companies refers to the throughputs that could by achieved if the refinery was run continuously for 365 days of the year. This is impossible in practice; shutdowns for maintenance are always required some time during the year. In addition, unanticipated breakdowns in parts of the refinery can affect output throughout the complex. This is one of the factors that Imperial takes into account in its reported refinery capacities and capacity utilization. "Rated capacities are based on definite specifications as to types of crude oil and feedstocks that are processed in the refinery atmospheric distillation units, the products to be obtained and the refinery process, adjusted to include an estimated allowance for normal maintenance shutdowns. Accordingly, actual capacities may be higher or lower than rated capacities due

to changes in refinery operation and the type of crude oil available for processing."[12] Reported capacities and capacity utilization is also affected by whether the original capacity of the crude tower is used or whether subsequent adjustments that boosted capacity are taken into account when capacity is quoted. If the adjustments to quoted capacity are not made, capacity utilization in excess of 100 percent can occur. Based on reported rates of capacity utilization, this appears to by the case for Petro-Canada, Suncor, and Husky Energy whose annual reports show capacity utilization in excess of 100 percent during part of the year and typically higher average capacity utilization than the other companies. Thus without full information, inter-company comparisons of capacity utilization may be misleading, but intra-company comparisons can be safely undertaken, particularly when made over relatively short periods. However, none of the foregoing detracts from the usefulness of capacity utilization information, including when it relates to system-wide information.

The present configuration of refinery capacities is the result of rationalization that took place in the 1970's and 1980's. Current capacity levels are well adapted to the level of demand and high rates of capacity utilization have been the norm in recent years. In addition to the fact that capacity levels are well adapted to the level of demand, there are also strong economic pressures -- high fixed costs in the form of capital-intensive plants and relatively fixed staff -- to operate refineries intensively. In cases where firms are not concerned about the effect of their additional output on price there is an incentive to increase output as long as variable costs can be covered, of which the principal one is the cost of crude oil. But in general it can be assumed that capacity utilization is sensitive to the level of sales, since aside from preparing for anticipated seasonal variation in demand refiners generally do not produce for inventory.

Reported capacity utilization of the three national companies and Suncor for 2002 and 2003, respectively, are: Imperial – 90 percent and 90 percent; Shell – 87 percent and 90 percent; Petro-Canada – 101 percent and 100 percent; Suncor – 95 percent and 95 percent.[13] Comparing capacity utilization in the first quarter of 2004 with the first quarter in 2003 Petro-Canada reports an increase from 101 percent to 103 percent, Shell an increase from 90 percent to 92 percent, Suncor an increase from 103 percent to 108 percent. Imperial states that capacity utilization was almost six percent higher than in 2002 and represented the highest output level in the last ten years. It is evident from these figures that the refiners were certainly not holding back production. However, capacity utilization in the second quarter fell as refiners undertook their normal spring maintenance, but was even lower than the comparable quarter in 2003. Petro-Canada went from 99 percent to 92 percent, Shell from 84 percent to 78 percent, Imperial from 91 percent to 88 percent and Suncor from 100 percent to 85 percent. In the case of Shell, it had undertaken "the largest shutdown in the Company's history" at the Montreal East refinery. (Quarterly Report, p. 3) Similarly, Petro-Canada had a major turnaround at its Edmonton refinery which included integrating equipment for processing low sulphur gasoline. (Quarterly Report, p. 7) Another major turnaround at its Montreal refinery is planned for the fourth quarter. Suncor experienced both planned and unplanned maintenance, and primarily as a result it went from a 12 million dollar profit in the second quarter of 2003 in its rack back or refinery operations to a 3 million dollar loss in the second quarter of 2004. Any thought that the shutdowns were coordinated should be dispelled by two important considerations. In the

[12] Imperial, *Information for Investors* (March 2004), footnote 2 to Imperial Oil Refineries.

[13] Ultramar's parent, Valero, one of the largest refining companies in the world, combines the information for Ultramar with another somewhat smaller refinery in New Jersey. Calculating capacity utilization from the throughputs for these refineries with their combined reported capacities provides the average capacity utilization for these refineries; 86.6 percent in 2002 and 91.5 percent in 2003. (Source: Valero 10K for 2003)

first instance the pain of the shutdowns was not evenly spread as each of the companies experienced different percentage impacts. Moreover, the companies replaced the lost output.

In 2004 each of the three national companies either equaled or exceeded first and second quarter sales of all petroleum products relative to 2003. On a combined basis, their sales were 1.5 percent and 4.4 percent higher in the first and second quarters, respectively. Gasoline sales, however, fell by 1.7 percent in the first quarter and 2 percent in the second quarter relative to values in 2003. Petro-Canada accounted for the most of the decline. Shell had a small increase in the first quarter, which was balanced by losses in the second, and Imperial's declines were small in both quarters. Suncor had a decline of 4.6 percent in the first quarter but its sales held even with those in 2003 in the second quarter. The figures for the four companies suggest that there was considerable jockeying for market share by the companies themselves and by their wholesale customers.

In the U.S. significant growth in demand relative to the response in supply is considered to be an important source of the volatility in gasoline prices. Because of the relative size of the U.S. and Canada and the generally close connections between wholesale markets in the two countries, the course of demand in Canada relative to capacity does not play the same role that it does in the U.S. since there is limited scope for prices in Canada to follow a separate path. In any event, the course of demand in Canada in the first half of the year is unclear.[14]

Economies of Scale, Other Barriers to Entry and Concentration It has long been recognized that there are significant economies of scale in petroleum refining.[15] In the most recent consideration of the issue, minimum efficient scale within the refinery proper is concluded to be exhausted in the range 24,000 to 32,000 m^3/d.[16] However, an earlier study noted that interviews had revealed that unit costs might continue "falling beyond the size of the largest modern plant with which any significant amount of construction and operating experience had been accumulated."[17] Moreover, the decline in unit costs resulting from size was found to be just as significant for infrastructure outside the plant, such as roads, jetties etc.[18] In any event there can be no doubt that there has been a drift towards larger refineries, and in situations where refineries have access to low cost transport to serve very large markets, as is the case in

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[14] Statistics Canada data shows growth of 3 percent in the first quarter and 1.9 percent in the second compared with 2003. This is in contrast to the results reported by the four companies whose results were discussed in the text and there is no reason to believe that their results were not representative for the industry.

[15] The logic underlying the decline in unit costs is derived from the relationship between the surface and volume of vessels. A doubling of the surface increases the volume by a much larger percentage. Costs would be associated with the surface of the vessel and the volume with its capacity. The same reasoning explains economies of scale in pipelines and storage vessels. Studies of the relationship between the costs and capacities of equipment in a number of process industries have demonstrated the presence, but varying importance, of economies of scale. (C.H. Chilton, ed. *Cost Engineering in the Process Industries*, New York, 1960)

[16] Federal Trade Commission, Bureau of Economics, *The Petroleum Industry: Mergers, Structural Change, and Antitrust Enforcement*, (Washington, 2004) p. 179

[17] The same study concluded that minimum efficient scale was exhausted at the outer range of the estimate in the text. Scherer, F.M. et al, *The Economies of Multi-Plant Operation*, (Cambridge, Harvard University Press, 1975), pp. 79 and 80

[18] C. Pratten and R. M. Dean, "Oil Refining", *The Economies of Large Scale Production in British Industry*, (Cambridge University Press, 1965), p.92

the U.S. gulf states of Texas and Louisiana, giant refineries well in excess of the estimated minimum efficient scale have been constructed.

Table 1
Canadian Refineries (thousands of cubic meters - 1000 m^3/d)

North Atlantic Refining	Come-by-Chance, Nfld	16.7
Imperial	Dartmouth, Nova Scotia	13.0
Irving	Saint John, New Brunswick	39.7
Ultramar (Valero)	St. Romuald, Quebec	34.0
Shell Canada	Montreal, Quebec	19.4
Petro-Canada	Montreal, Quebec	16.7
Imperial	Nanticoke, Ontario	17.8
Petro-Canada	Oakville, Ontario	13.2
Imperial	Sarnia, Ontario	19.2
Shell Canada	Sarnia, Ontario	11.4
Suncor	Sarnia, Ontario	11.1
Consumers' Coop	Regina, Saskatchewan	10.1
Petro-Canada	Edmonton, Alberta	19.9
Imperial	Edmonton, Alberta	29
Shell Canada	Edmonton, Alberta	18.2
Chevron	Vancouver, BC	8.3
Husky	Prince George, BC	1.6

Source: Company Annual Reports and Natural Resources Canada

The effect of economies of scale and Canada's relatively small size is a high level of concentration in all regions. There is a single refinery in Newfoundland, two refineries in the Maritime provinces, and Quebec and Ontario have a total of five companies: the three national companies and the Suncor and Ultramar. In the West, the three national companies have the bulk of capacity in the three refineries in Edmonton, and there is a sole independent in Regina, and Chevron and Husky in British Columbia. Although inter-regional product flows and exchange agreements probably reduce the concentration as measured by sales, concentration remains high by any of the standard measures.

Entry barriers into refining are very high. In addition to economies of scale, investments in refineries represent sunk costs. Moreover, obtaining regulatory approvals that all environmental conditions were being met would, at the very least, delay the building of a new refinery for some time. Commentators in the U.S. are very pessimistic about the prospects of overcoming regulatory barriers. Finally, in the present environment of high crude oil costs, the difficulty of predicting demand creates a high risk factor. In the 1970s and 1980s, high energy costs led to reduced sales as the result of the introduction and adoption of more energy efficient vehicles, equipment and other means of economizing on energy use, with the result that there developed extensive excess refining capacity.

In interpreting the size distribution of existing plants it is necessary to bear in mind that estimates of minimum efficient scale are based on plants built de novo. However, existing plants have been expanded

over the years and there may be duplication of individual operating units. Petro-Canada's Oakville refinery is a case in point; it has two distillation towers. Thus at least in that part of the operation there are in effect two much smaller refineries than the size of the refinery indicated by the total distillation capacity. Additionally, some of the higher unit costs resulting from smaller size are, in a sense, bygones. Although the unit costs of plant, equipment, control systems and outside facilities decline with size, once the smaller plant is built, the major concern is ensuring that ongoing costs are covered. Thus it is not unusual for different size plants to coexist in the same market. But over time the smaller plants tend to disappear unless they enjoy advantages of location such as low-cost sources of crude oil or there is not easy access to their markets by other competitors.

While Canada does not have the very large refineries found in the U.S. and other parts of the world, on the whole, the size distribution of its refineries is fairly efficient. A little more than a third of total capacity is accounted for by refineries of the estimated minimum efficient scale, and ten (59 percent) of the seventeen refineries have capacity in excess of 16,000 m^3/d compared to 42 percent of refineries in the U.S. [19]

The Firms and Recent Adjustments in the Industry. Increasingly stringent environmental requirements, particularly a reduction in the acceptable level of sulphur in gasoline and road diesel has necessitated investments in additional equipment. The closure of Petro-Canada's Oakville refinery will coincide with the introduction of a more stringent standard for the sulphur content in gasoline January 2005. A far larger reduction in the sulphur content in diesel will go into effect June 2006.[20]. Suncor and Shell, with two of the smaller refineries, are meeting the high investments required for a hydrotreater to meet the sulphur in diesel standard by entering into a 20 year processing agreement. Suncor will build the unit at an estimated cost of $300 million dollars.[21] This is an example of economies of scale at work; before entering into the agreement with Shell the estimated cost of meeting solely Suncor's needs was $225 million.[22]

Yet Husky will be investing $73 million to meet the more stringent sulphur requirements for gasoline and diesel in its tiny refinery in Prince George.[23] How can it be worthwhile for Husky to make the required investment in the light of the closure of the Oakville refinery. The answer is the same as that which explains the existence and survival of the refinery previously. It has a ready source of (presumably less expensive because relatively nearby) crude oil.[24]

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[19] FTC study, p.7

[20] In its support for the reversal of the Trans-Northern Pipeline, discussed subsequently, Petro-Canada implied that it was cheaper to obtain supplies from alternative sources than to upgrade the Oakville refinery. (NEB Reasons, p.4) Similarly, the Federal Trade Commission reports the closure of two refineries in 2001 and 2002 in the Oakville refinery's size range in response to having to meet fuel specifications. (Op. cit. p.182)

[21] The cost to build the hydrotreater is higher than it would be if it was to be used solely to treat diesel since it is planned to use it to reduce sulphur dioxide emissions from the refineries.

[22] (Op. cit. p.4)

[23] The investment also results in a 10 percent increase in the rated capacity of the refinery.

[24] At a distance of 778 kilometres from Vancouver it is fairly remote which might suggest that it is somewhat sheltered from the competition of distant refineries. However, Husky has retail outlets in large parts of Western Canada. It supplies these by exchanging product with other refiners that have outlets in the area of Prince George. Exchange agreements are dealt with later in the text.

The closure of the Oakville refinery will be accompanied by the reversal of the Trans-Northern Pipeline that ran in a west to east direction between Farran's Point (close to Cornwall) and Toronto. The reversal was required in order to allow Petro-Canada to replace lost production through expansion of its Montreal refinery and through imports and purchases from domestic refiners. Currently points east of Cornwall were supplied by Ontario based refineries, who also had access to Ottawa via a loop from Farran's Point to Ottawa. But the line to Farran's Point was only operated at 20 percent capacity, and Ottawa was mainly supplied out of Montreal via the east to west running portion of the line to Farran's Point. The expansion of capacity and the reversal of the line will provide up to 11,500 m^3/d of additional supply to Ontario locations west of Farran's Point, which compares to the 9800 m^3/d of light products that were being produced in the Oakville refinery. However, Petro-Canada and Ultramar, the two principal supporters of the application, were only granted priority access to 9100 m^3/d between Montreal and Toronto on a ship-or-pay basis. (7280 m^3/d for Petro-Canada and 1820 m^3/d for Ultramar) In its submission to the NEB, it was anticipated by Petro-Canada that an additional 2000 m^3/d of exchanges (to be added to the 4000 to 5000 m^3/d already in place) between Ontario and Quebec based refiners might be required to meet the needs of the refiners who supplied mid-points between Toronto and Farran's Point. The exchange agreements would entail the transfer of product to these refiners in Montreal for shipment to locations such as Belleville and Kingston, in return for product provided in Toronto.

Petro-Canada planned to replace supply from the Oakville refinery through an increase in capacity of its Montreal refinery by removing bottlenecking in some processes and through the purchase of imported or domestic supplies. It also planned to increase the terminal capacity at Oakville. But the general effect is a reduction in domestic capacity and any purchases by Petro-Canada from domestic refineries will have the effect of making domestic supplies tighter for independent marketers.

One of the effects of the line reversal will be to increase the presence of Ultramar in Ontario. As can be seen in Table 1, Ultramar operates the largest refinery devoted primarily to domestic markets. In addition, it planned a further increase to 35 771 m^3/d by January 2005. (NEB Decision, p.6) The increase in capacity is associated with investments to meet lower sulphur thresholds for gasoline and will result in increased supplies of that product. Ultramar has long sought to expand its limited presence in Ontario. Ultramar addresses local markets south and west of Quebec City via a unit train to Montreal. In September 2002 it inaugurated a terminal in Maitland, Ontario that it acquired and upgraded. Part of the upgrade was the addition of rail that would allow the terminal to accommodate a unit train. The Maitland terminal is intended as a staging area for the supply of eastern Ontario and parts of New England. (Ultramar news release, September 19, 2002) The tank truck loading racks have a capacity of 3 023 m^3/d. This capacity, the capacity on the Trans-Northern Pipeline that it has reserved as part of a use or pay agreement, additional pipeline capacity available to it and other shippers on a common carrier basis, and any exchange agreements that it may enter into that would provide it with additional product in Ontario will provide Ultramar with a much greater presence in Ontario than it has been able to achieve until now. The effect of the actions taken by Petro-Canada and Ultramar is to bring a closer connection between Montreal and Toronto and points in between.

This summary of refinery structure ignores the fact that the east and west coasts are available to imports by ocean going vessels, as is much of Ontario and Quebec, either directly or via the Trans-Northern

Pipeline. But there are very few independent terminal operators. The relatively thin volume of sales open to them, adds to the normal risks of importing product in shipload quantities. In addition, however, many locations are close enough to U.S. terminals so that independents can truck product from the U.S. if the discrepancy in prices covers the cost of transportation. The role of imports is taken up in the discussion of wholesale prices.

Although wholesale markets tend to be regional and retail markets local, it is useful to summarize the relative position of the three national companies from a national perspective since the Atlantic Provinces are the only region in which they do not each have a strong refining presence. Imperial is by far the largest refining company in Canada. It holds at least 26 percent of total refining capacity. In 2003 its capacity of 79 000 m^3/d compares to net sales of refined products of 70 400 m^3/d . Petro-Canada's current capacity is 49 800 m^3/d, well below its sales of 56 800 m^3/d. It is particularly short of capacity in Quebec and Ontario and relies on purchases to make up the difference. As a result, unlike Imperial, it is a very minor participant in the wholesale market, particularly in Eastern Canada. Following the closure of the Oakville refinery Petro-Canada's total capacity will fall to 40 600 m^3/d, assuming that removing bottlenecks adds 4 000 m^3/d to the Montreal refinery. Shell's capacity of 49 000 m^3/d compares to its sales of 45 700 m^3/d in 2003. The sales of Imperial and Shell have been fairly flat over the last 8 years, Shell's went from 43 500 m^3/d in 1996 and 45 400 m^3/d in 2000 and Imperial from 72 400m^3/d in 1995 and 75 700 m^3/d in 1999. The experience of Shell and Imperial are in marked contrast to that of Petro-Canada. It had sales of 41550 m^3/d and 51 200 m^3/d in the corresponding periods, thus increasing its sales by about 37 percent between 1995 and 2003. These figures indicate that the national companies pursue different agendas. Similar contrasts will appear when comparing their experience in boosting throughputs per retail outlet.

Irving and North Atlantic Refining are the principal export refineries in Canada. In 2003 they accounted for 79 percent of total Canadian exports of refined petroleum products, of which gasoline and diesel constituted 85.5 percent of the total. Translating their export sales to a daily basis, they represented of the order of 93 percent of the capacity of the Come-by-Chance refinery and 74 percent of the Irving refinery.[25] The potential competitive influence of Irving is understated by the amount of capacity devoted to domestic sales since it can divert product used for exports to domestic sales if it becomes profitable to do so with the effect of bringing about a closer correspondence between US. and Canadian wholesale prices along the eastern seaboard. North West Refining is in a unique position: prices in Newfoundland are regulated.

Irving's current distillation capacity was reached in 1974. However, major investments in conversion equipment in 1999, at a cost in excess of one billion dollars, allowed it to change the composition of its output. "The upgrade will shift the products from heavy fuels such as bunker to cleaner transportation fuels such as low-sulphur diesel and Irving Supreme gasoline." The capacity to provide a greater volume of lighter, cleaner products is reflected in its export sales, which increased by 57 percent from 1999 to 2003.[26] (*NEB Appendices to Annual Reports*) It is also likely that there were important repercussions in

[25] The figures are necessarily approximate and somewhat overstated because the NEB does not include "propane, butane, lubricants, greases, asphalt, petrochemicals, etc." in the export totals. (*NEB 2003 Appendices*, Appendix B)

[26] There is a minor irony associated with these figures. A recent article in September 6, 2004 *Globe and Mail* ("Canadian gasoline flows south to thirsty U.S. market", B5) discusses the large increase in exports to the U.S.

Canada in a more competitive situation in the Maritimes. This possibility is taken up in the discussion of wholesale prices in St. John and Halifax in a later section.

The remaining two regional refineries are Chevron in Vancouver and Consumers' Coop in Regina. The Chevron refinery is a conventional one and there is little to add about it. The Consumers' Coop refinery is more unique. It is located in an area of heavy oil - - oil that is too viscous for processing in a distillation tower. The province of Saskatchewan and Consumers' Coop jointly own an upgrader that provides the synthetic oil for the refinery. The capacity of the refinery was recently expanded by 3182 m3/d to accommodate the refining of synthetic crude supplied by Suncor under a long-term agreement. Based on the list of equipment in the survey by the Oil and Gas Journal referred to previously, the refinery is a sophisticated one and produces a full slate of products.[27]

PRODUCT EXCHANGES[28] and TERMINAL THROUGHPUT AGREEMENTS

Terminals, like refineries, have rack facilities for loading tanker trucks of the refiners or wholesale customers for deliveries to retail outlets, in the case of gasoline and diesel, and to homes and business establishments in the case of heating oil. As the name implies, terminals are usually connected to a principal transportation artery. For the most part, this is a pipeline and occasionally a train. In Atlantic Canada the primary means of moving product is via ship. According to Natural Resources Canada, there has been significant rationalization over the last 20 years, to the extent that in some locations there is a single terminal serving a number of suppliers.[29] There has also been widespread closure of terminals in the U.S., with the total falling from 2293 in 1982 to 1225 in 1997. [30] The closure of terminals in both countries has been made possible by agreements among refineries that allow for the sharing of facilities.

As indicated in the discussion of the reversal of the Trans-Northern Pipeline, by entering into product exchanges refiners are able to sell into a wide area without necessarily incurring the cost of transporting product from their refineries. However, to allow for the fact that locations differ in their proximity to a refinery, a location differential is often paid. For example, a location differential would have to be paid for product supplied in, say, Rimouski, relative to product supplied in Toronto. Exchange and terminal services agreements often allow suppliers to sell over a wider area than they would otherwise find it profitable to serve. In any event, the agreements certainly allow them to do so at lower cost. Furthermore, the agreements encourage the concentration of refinery capacity and thus contribute to the building of larger refineries.

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between 1999 and 2004. It states: "Refinery capacity has barely budged during that time, meaning that a growing proportion of domestic gasoline production is being shipped to the United States amid a time of rising pump prices." In fact 85 percent of the increase in total exports of all products was accounted for by Irving, primarily, and North Atlantic Refining. The author of the article was misled by considering solely distillation capacity and by a reliance on U.S. data which do not identify the companies doing the exporting to the U.S.

[27] In contrast, the Husky Energy refinery in Lloydminster, which has not been included in Table 1, produces primarily asphalt.

[28] "Product exchange" is used here as a shorthand. For the most part the companies have entered into buy/sell agreements. But the effect is the same since there is a balancing of the amounts purchased and sold.

[29] Overview of the Canadian Downstream Petroleum Industry, February 2004

[30] U.S. Census Bureau, as cited in Federal Trade Commission, *The Petroleum Industry: Mergers, Structural Change, and Antitrust Enforcement*, an FTC Staff Study, August 2004, p.237.

Another set of agreements relate to terminal services. Contracts respecting terminal services can take several forms. Users may simply pay for the services, based on volume and length of storage. Frequently, however, the agreements provide for equal volumes of throughput over a specified period. Therefore there is no need for any payment by either party. Occasionally a terminal may be operated as a joint venture. The advantage of these various agreements that allow suppliers to share terminal facilities is that duplication is avoided. Where facilities already existed (which can be taken to be the general case in Canada and the U.S.) the principal savings from the viewpoint of terminal operation are in operating costs, including maintenance. Another important source of savings is derived from the fact that the higher rate of throughputs means that the refiners carry less inventory.[31]

As an important aside, the price volatility in the U.S. has been attributed in part to the fact that the refiners have learned to operate with lower inventories. The smaller level of inventories is less successful in cushioning price against unanticipated increases in demand or decreases in supply. In my view, at least part of the reason for reduced inventories is associated with the closure of terminals as a result of terminal sharing agreements. If correct, this is a hidden cost of the agreements to share terminal facilities that does not appear to be recognized.[32] This is not an important issue in Canada because of its smaller size; compared to the U.S. it is relatively easy to make up a shortfall in supplies through imports.

Since the terminals in a region are often owned by the refiner in closest proximity to them, in some cases they are a necessary adjunct to a product exchange agreement. Blending facilities at terminals allow each of the marketers using a terminal to include their additives, where they provide them, to the gasoline of the refiner supplying the terminal. Of course product exchange and terminal agreements do not necessarily meet all needs, as the discussion of Ultramar's Maitland terminal, which receives product by train, illustrates.

Although the agreements in question are generally cost reducing and competition increasing, the fact that competitors are getting together to discuss anything invites further consideration. If nothing else, the agreements do provide the opportunity for refiners and other suppliers to meet and discuss supply arrangements. It is therefore useful to explore whether the meetings are a likely source of illegal or otherwise anticompetitive arrangements. The conspiracy section of the Competition Act makes it an offence for a person to enter into an agreement or arrangement with another person to prevent or lessen, unduly, competition in the sale of or supply of a product through the fixing of prices or through market sharing arrangements. With respect to a possible agreement on prices, the supply and facilities agreements are entered into periodically, and at different times between agreeing parties, while prices at all levels move often and very quickly. Agreements on price levels through periodic meetings is virtually impossible. This argument, however, does not apply to possible agreements on price differentials. There is, however, a critical consideration negating the possibility of using meeting to negotiate product exchanges and facilities sharing agreements as an opportunity to agree on anything: the agreements are

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[31] This is brought out in Shell's *2000 Annual Report* (p.30) "The closure of two distribution terminals at Belledune, N.B., and Lewisporte, Nfld., reduced finished product inventory ..."]

[32] The level of inventories is usually considered in terms of the range between the average high and low levels over the previous five years. But to observe the effects of the refinery closures one would have to trace the level of inventories relative to sales over a number of years. As a logical imperative, the inventory to sales ratio had to follow as terminals were closed, everything else being the same.

always entered into bilaterally. If the firms were going to risk an agreement that could result in fines or jail sentences it would be far easier to do it directly rather than through some complicated chain of bilateral meetings. Thus not only is there no evidence that the meetings on supply arrangements are used as an opportunity to fix prices, logic suggests that it would be a foolish way to proceed.

What about the content, per se, of the agreements? This depends on whether the agreements entail the mutual closure of terminals. Only in that case is there the possibility of a limitation of supply in a market. Assume, for example, two firms each have a terminal in two locations and that they each agrees to close one so that a single terminal remains in each location. If the terminals were so-called "public terminals", that is available for general use by market participants,[33] then the closure would reduce the availability of terminal services on offer. Apart from terminals associated with pipelines, there are not, to my knowledge, public terminals; terminal services are generally acquired through the exchange of terminal services. This leaves for consideration the volume of product to flow through the terminals. If there are only the two firms the agreement on volumes could constitute an agreement to share the two markets, with the market shares determined by the amount of product that could flow through two terminals. However, this is a limiting and hypothetical case intended to demonstrate the conditions that require investigation. In fact, the number of suppliers using a terminal will depend on the number of marketers that do not themselves have terminal capacity in the area, and each will negotiate a volume of throughput that meets their supply needs. Thus agreements on the sharing of terminals is highly unlikely to have anticompetitive effects that offset reduced cost that encourages wider geographic coverage by firms and more competition.

PRICE VOLATILITY in the U.S. and its RELEVANCE to the PRESENT INVESTIGATION

In order to appreciate wholesale price movements in Canada it is useful, but not strictly necessary, to understand the forces that are operating in the U.S. One could simply take the prices in the U.S. as given and focus on whether the increase in Canadian prices was the result of an increase in the spread between Canadian and U.S. prices. Assuming that there was no such increase, one could conclude that the increase in Canadian prices was the result of a continuation of a long-standing relationship that has not been found to be objectionable in the past. In the event that the increase in Canadian prices was partly the result of an increase in the spread, the focus would be on the reasons for the increase and whether they were associated with anti-competitive acts by Canadian refiners. But given that the Canadian refining industry is heavily dependent on the course of the industry in the U.S., it is useful to explore the forces driving prices in the U.S. If nothing else, it may provide indications of whether price spikes in the future are likely.

Two components of price were responsible for the spike in U.S. wholesale prices: increases in crude oil prices and increases in the spread between the price of crude oil and the wholesale price of gasoline. The causes of the increase in crude oil prices are much commented on and there is little point in adding to this discussion even though this was the major explanatory factor. The reasons for the increase in refinery margins are worth identifying, however.

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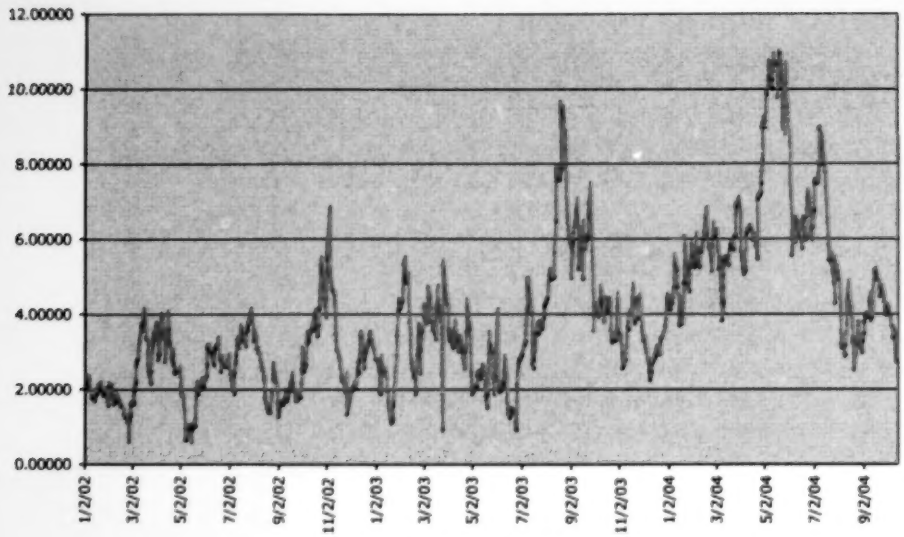
[33] Federal Trade Commission, Structural Change etc, p.218.

Chart 1: Gasoline Crack Spead New York



Source: Energy Information Administration

Before proceeding with that discussion a review of the extent of the price spike and its aftermath are in order. Chart 1 shows the price of WTI crude oil and the spot price for regular gasoline in New York Harbour (NYH). Since the beginning of 2003 the average crack spread (difference in the cost of WTI crude oil and the spot price of gasoline) is 4.75cents/L. (all figures are in American units) In the spike in August 2003 the spread reached 9.65 cents/L and then fell in jagged fashion during the remainder of the year - a short-lived spike. However, the spread started to recover in January and showed appreciable but fluctuating increases in April 2004 until the spread clustered around 10 cents/L during most of May. Unlike the spike in August 2003, for the most part spreads remained higher than average until the end of July. Since then, there has been a reversal.

A study of the price spike starting to develop in April 2004 (the third in a little more than a year) listed the following factors relating to refinery issues as contributing causes:[34]

- "A shortage of refinery capacity – resulting from a lack of new construction – such that the nation needs to import about 1 mbd of blending components and finished gasoline from foreign refineries. Increasingly challenging fuel specifications – including the MTBE ban in several states [California, New York and Connecticut] and the 2004 standards for reduced sulfur content – add to the complexities of refining and distribution.
- Steadily growing gasoline demand, which has increased by 500,000 barrels per day since 1999 … .This has accounted for virtually all the nation's increase in oil consumption.
- Gasoline inventories were low; as of early April, there was less than two days of available supply in the system.

[34] Lawrence Kumins and Robert Bamberger, *Gasoline Price Surge Revisited: Crude Oil and Refinery Issues*, Congressional Research Service, April 8, 2004, pp. 11-12.

- Crude oil stocks are below normal seasonal levels, having just rebounded from below minimum operational levels. There is little refining capacity to make more gasoline, and crude might not be available [due to low inventories held at refineries] even for that small increment."

It is evident that no single factor was solely responsible for what turned out to be a sustained increase in crack spreads. However, some ranking is possible. The most important and long-lasting factor is the level of capacity. Refineries were reported to be operating at about 95 percent capacity, which left little room for adjustments to unanticipated increases in demand or reductions in supply. This situation is unlikely to change in the foreseeable future.

As discussed earlier, the ordinarily high entry barriers into refining, stringent pollution control conditions governing the construction of new facilities, along with uncertainty about future demand, make it highly unlikely that there will be any major additions to refinery capacity in the near future. As has been true through part of the 1990's and continuing, additions to capacity are most likely to take the form of modifications of existing refineries. Therefore, the U.S., and particularly PADD 1 (predominantly the eastern seaboard), will remain dependent on imports to balance insufficient supplies. I have not seen any studies that measure excess capacity to produce gasoline in the Atlantic Basin. While it is generally known that there is a steady shift away from gasoline towards diesel, the full extent of export capacity in Europe is not generally available. Thus it is not known how much cushion imports can provide against continuing upward pressure on prices if demand continues to increase. In any event, only adequate resiliency in the domestic system can prevent occasional spikes in price.

Low inventories of gasoline[35] and crude oil prevented adjustments to growing demand without a run-up in prices. There is a view that the principal reason that stocks for both gasoline and crude oil were low was that there was backwardation in the futures market, namely that prices for future delivery were lower than those in the near present. This implied that there was a general expectation that prices would not be sustained. The effect would be to limit the refiners' ability to hedge against a fall in prices. Thus available capacity was not being used to add to gasoline stocks and refiners were reluctant to hold more than minimal amounts of crude oil. Whatever the merits of this explanation for the low inventory levels, it is one that can only operate temporarily; eventually expectations adjust. However, significant fluctuations in crude oil prices could recreate the conditions whereby this explanation for low crude and product stocks could again apply.[36]

The fact that there are 18 different formulations of gasoline (excluding differences due to octane ratings), is pointed to as another factor that limits supply flexibility since the general result is greater geographic segmentation. In spite of frequent news stories regarding concern by lawmakers about this situation, it does not appear that action to limit the number of formulations is at hand.

The conditions that resulted in the run-up in refinery margins are thus likely to be continuing ones and it can be expected that there will be periods of surging prices of gasoline and other refined products. However, if crude oil prices stay high, corrections to the problem of limited refinery capacity may come from the demand side as energy use declines in response to higher prices.

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[35] Inventories as measured against the high and low levels held in recent years. The fact that terminals were closed in previous years is a structural condition that is built into these inventory levels.

[36] Most refiners engage in extensive hedging since small movements in prices can devastate the bottom line.

WHOLESALE PRICES

There are various sets of wholesale prices. Furthest from retail prices are those determined where many buyers and sellers trade in large quantities. This is true of the commodities exchanges where futures contracts are sold. The same applies to the spot prices arrived at in centres such as New York, Chicago and Rotterdam where large volume sellers and buyers quote asking and offering prices. There are no equivalent markets in Canada, so refiners here (as in the U.S.) look to these markets (as well as to crude prices) for information on the near term course of the next level of wholesale prices, which is product sold at the rack at refineries or terminals.

The refiners (or other sellers) quote or post these rack prices. These prices often hold for two or three days, but the changes could be more frequent. Unlike spot and future prices, in Canada rack prices are rarely transaction prices since the purchases are generally made as part of a contract that includes discounts off the rack price based on considerations such as the volume of sales over specified periods and the credit worthiness of the buyers. Wholesale buyers are responsible for transportation from the rack to retail outlets and ordinarily are purchasing generic gasoline; i.e., without the additives in the gasoline marketed by the refiners. In the U.S. there is a parallel set of rack prices for branded gasoline. There, refiners have surrendered the recruiting of dealers and supply to them that has been handled internally by Canadian refiners, to jobbers. Recently, Imperial has entered into a jobber arrangement with an Ontario firm.

The final set of wholesale prices is that charged to branded retailers. In the case of one refiner, these prices are tied to rack prices unless retail prices charged in an outlet controlled by the refiner in the vicinity of the retailer fall below rack prices. In that event prices are adjusted. Some other refiners base the wholesale price on prevailing retail prices.

Geographical Relationships between Spot Prices. Petroleum products, like crude oil, are internationally traded commodities. Over time, when adjustments to regional changes are allowed for, there is pattern of price relationships. Over a six year period starting in 1998, there were the following average daily spot prices for regular gasoline, in U.S. cents per gallon: Rotterdam – 71.02; U.S. Gulf – 74.33; New York – 75.54; Chicago – 78.21; and Los Angeles – 85.94. The price in New York cannot long exceed the cost of transportation from the U.S. Gulf, the major source of supply, or from Rotterdam, one of several sources of imports. There is a distinct upward east to west drift in prices. The west coast, does not have close supply points alternative to regional production. Thus although the average price in Singapore over the same period was 69.02 cents/gal, which was lower than Rotterdam's, the great distances do not allow it to have a dampening effect on prices on the west coast.

There is a similar, but broken east to west pattern for rack prices in Canada. Several points arising from Table 2 and information outside it are worth noting. Information for a number of centres has been omitted from the table in the interest of manageability. In the case of St. John's, its regulated maximum price is a cent per litre higher than that in Saint John and somewhat more than that in Halifax. The difference in transaction prices might be even higher if the regulated environment does not encourage the

negotiated discounts that occur in other parts of the country.[37] As seen in Table 2, what has been identified as the east to west pricing pattern did not hold for the entire period. This is explored more fully later.

Prices in Montreal and Quebec City are virtually identical. This suggests that Ultramar is the key price leader in both centres. It would be very surprising if it were not responsible for the price in Quebec City, where it is the only refiner. Thus it is likely that prices in both centres are set by Ultramar at the same time.

Toronto and Sarnia, two refining centres connected by a pipeline, also have virtually identical prices. Based on similar reasoning to that applied to Montreal and Quebec City, it is likely that Imperial is the price leader in both locations, since it is the only company with refineries in both centres.

Finally, as discussed below, the east to west pattern is broken by the fact that pricing from Thunder Bay to Kamloops is determined by the price in Edmonton plus a differential. Thus Thunder Bay and all of the other points east of Edmonton have higher prices than Edmonton itself.

Table 2
Selected Canadian Rack Prices

Period	Saint John	Montreal	Toronto	Edmonton	Vancouver
1998-2004	31.00	30.51	31.72	31.91	32.99
Jan–May/04	42.47	42.87	43.49	43.47	43.92

Source: JC Ervin & Associates

Pricing in Western Canada. Edmonton is the refining center in Western Canada with each of the three integrated major oil companies operating a relatively large refinery. The only other multi-product refinery operating between Sarnia and the east coast is the Consumers' Coop in Regina. The output from Edmonton is shipped east and south by a number of product pipelines that reach Calgary, Regina, Saskatoon and Winnipeg. Product to Thunder Bay is transshipped from Winnipeg by train. Kamloops and Vancouver are supplied by a dual-purpose pipeline that accommodates crude oil as well as refined products. The price set in Edmonton, along with fairly stable location differentials' determines the price throughout a wide area, stretching from Kamloops at the Western extreme to Thunder Bay in the East. As the series of charts numbering from two to six demonstrate, the difference between prices in Edmonton,

[37] Maximum wholesale and retail prices are set by the Island Petroleum Regulatory Commission and Appeals Commission and the Petroleum Products Pricing Commission, respectively, in Prince Edward Island and Newfoundland and Labrador. The latter body was integrated with the Public Utilities Board at the end of May 2004. Because of the large distances in Newfoundland and Labrador maximum prices are established for a number of geographic zones.

on the one hand, and Calgary, Regina, and Winnipeg on the other, have for the most part either been constant, or have undergone discrete changes, as in the case of the Calgary-Edmonton price differential.

Apart from occasional variations, there have been very stable relationships between the rack prices in Edmonton and Calgary. In the earliest period the differential was 0.40 cents[38]/L. This was subsequently changed to 0.60 cents/L and then to 0.80 cents/L. The amount of the Calgary-Edmonton differential is larger than the cost of transporting gasoline from Edmonton via the pipeline which is presently 0.455 cents/L, well below the differential of 0.80 cents/L. We were informed that the capacity of the pipeline was sometimes fully utilized and that product has to be shipped by truck, thus adding to the average cost. It is difficult to know how important this factor is in explaining the differential, but it is doubtful that the stability of the differential and the shifts in it can be explained by stable transportation cost. It is more likely that there is a strong pattern of price leadership. The same thing can be said with regard to the other differentials. One of the most stable differentials has been the steady 0.60 cents/L between Regina and Edmonton. In 1998 the transportation cost was approximately 0.24 cents/L. It increased to about 0.43 cents/L in 2001 and was about 0.52 cents/L in 2003. Clearly the differential was established and maintained independently of the cost of transportation. In the case of Winnipeg-Edmonton the differential has been fairly steady around a dollar, which is close to the current cost of transportation, but does not correspond to earlier costs.[39]

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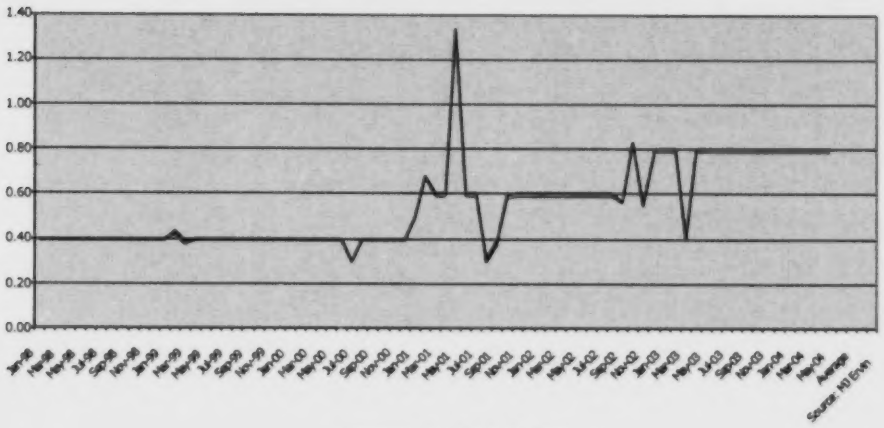
[38] One of the major breaks in the pattern occurred between April and October of 2001 as average monthly prices underwent several large changes. The average monthly rack prices per litre in Edmonton during those months were: 36.53, 42.8, 41.72, 33.37, 40.33, 45.08, and 30.63 cents, respectively. As prices increased sharply between April and May in Edmonton, they increased by a larger amount in Calgary and the reverse happened as prices rose in August and September. What is noteworthy about these departures from a strong pattern is that the same departures occurred in the more or less constant price differentials between Edmonton and the other centres during those months. Similarly, when another sharp break in the Calgary-Edmonton differential occurred in March 2003, there were similar changes in the price differentials between Edmonton and the other centres. Once again it was during a period of price volatility due to changes in the price of crude oil. However, the recent rapid run up of crude oil prices and the accompanying increases in wholesale prices have not resulted in similar departures in established differentials.

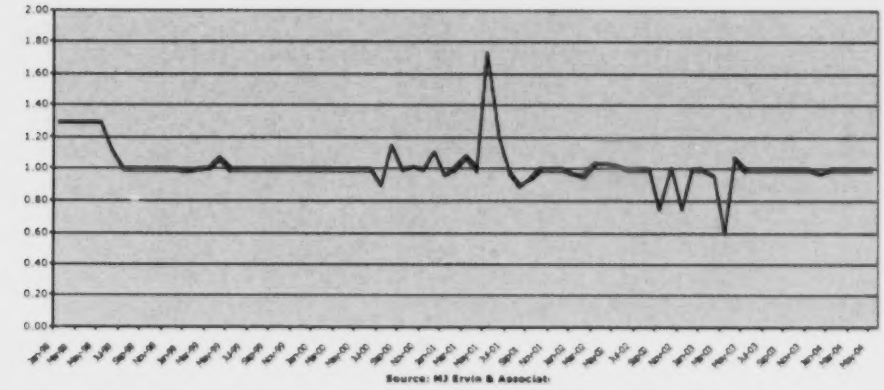
[39] There are two legs to the route: Edmonton to Gretna, the longer haul, and Gretna to Winnipeg. Rates for the former were easier to obtain since the tolls are controlled by the N.E.B. In 1998 the rate was 0.43 cents/L and reached 0.75 cents/L in 2003. I am grateful to Craig Rubie of the N.E.B. for his help in obtaining the rates for earlier years.

Chart 2: Rack Price Differentials:Calgar



Source: MJ Ervin & Assc

Chart 3:Rack Price Differential: Winnipeg-Edmonto



Source: MJ Ervin & Associat

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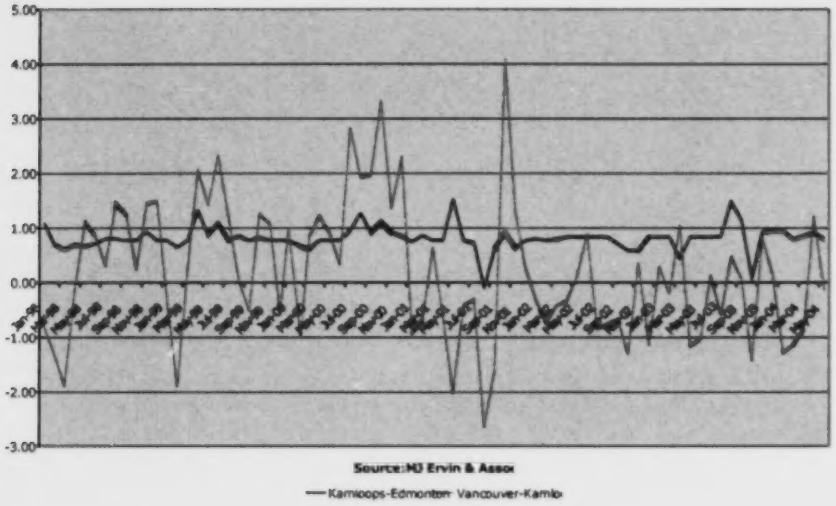
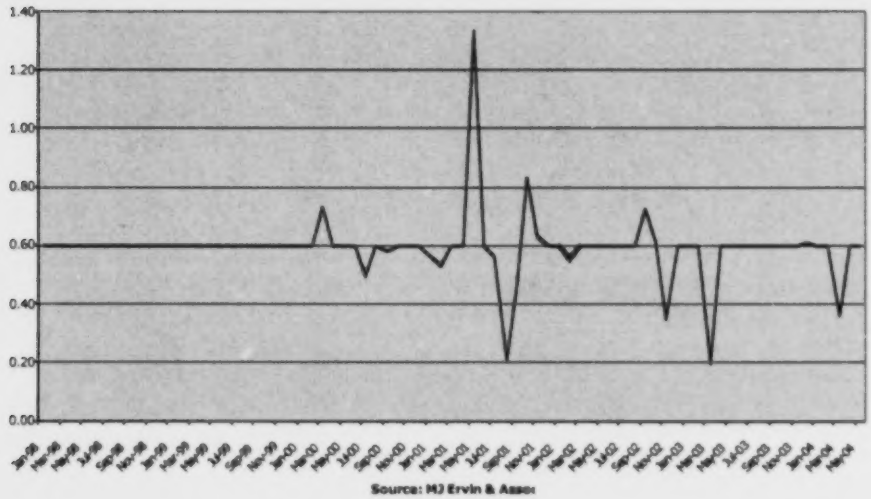
Chart 4: Rack Price Differentials:Kamloops-Edmonton,Var



Source:MJ Ervin & Asso(

—Kamloops-Edmonton Vancouver-Kamlo

Chart 5: Rack Price Differentials: Regin

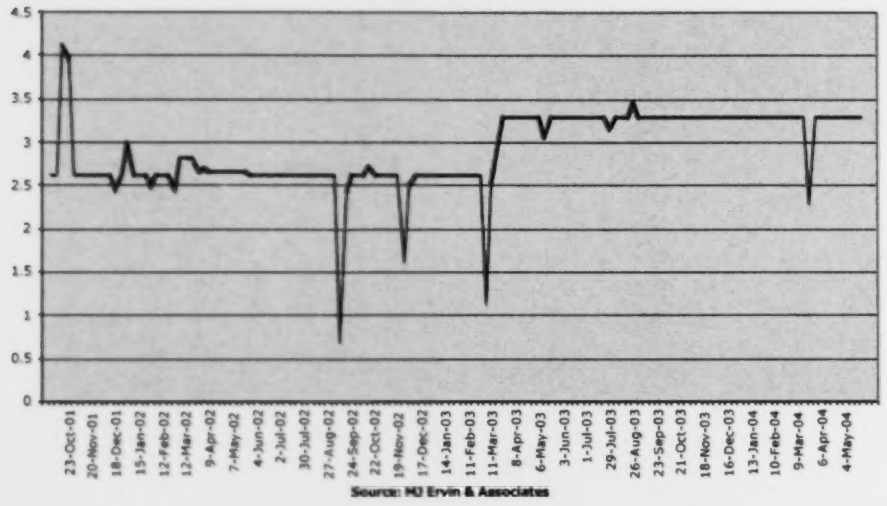


Source: MJ Ervin & Asso(

Because of the possibility of arbitrage between Kamloops and Vancouver, the relation between prices in Kamloops and Edmonton is the most interesting. With a road distance of roughly 350 kilometers between Edmonton and Kamloops it is feasible to transport product by truck in either direction. It will be noted that the chart showing the differential between Kamloops and Edmonton also shows the differential between Vancouver and Kamloops. The purpose is to see whether large differences in the latter differential triggered changes in the Kamloops-Edmonton differential as presumed arbitrage causes the price in Kamloops to rise or fall thus causing a respective widening or narrowing of the Kamloops-

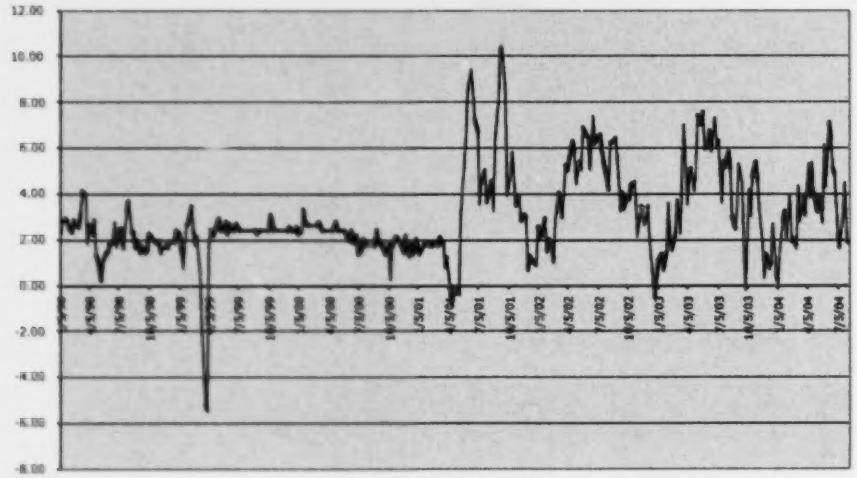
Edmonton differential.[40] Although several deviations in the Kamloops-Edmonton differential can be traced to large changes in Vancouver-Kamloops, other factors also must have been in play.

Chart 6: Rack Price Differentials:Thunder Bay-Edmonton



Source: MJ Ervin & Associates

Chart 7: Rack Price Differentials: Thunder Bay-Sarnia



Source: MJ Ervin & Associates

[40] The pipeline cost of product shipped from Edmonton to Kamloops was 0.81 cents/L in 2000. (The next relevant figure available is 0.67 cents per litre in 1996.) Thus the rack price differential is closer to the pipeline costs than is the case for the other centres.

Pricing in Thunder Bay is only tied to Edmonton in the second half of 2001. Before then there is no discernible relationship. Since product is shipped to Thunder Bay from both Sarnia (by ship) and Edmonton the possibility that Sarnia was used as a benchmark for Thunder Bay prices in the earlier period was explored. Although the Thunder Bay-Sarnia differential is not as regular as that between Thunder Bay and Edmonton, prices in Thunder Bay do appear to be tied to those in Sarnia until June 2001.

Given the fairly stable relationships between prices in Edmonton and those in centres ranging from Kamloops to Thunder Bay,[41] it is clear that the key to understanding the level of prices in Western Canada is an understanding of how prices in Edmonton are determined. Unlike cities in the east, Edmonton itself is fairly isolated relative to U.S. cities that might serve as supply points to independent wholesalers. Thus it is unlikely that a concern about arbitrage would be a motivating factor in pricing. According to information supplied by companies, prices in Minnesota and, to a lesser extent, Chicago are used as benchmarks in setting prices in Edmonton. Regardless of whether refiners are facing continuing pressure from potential arbitrage, it must be helpful to have benchmark prices to use as a guide when setting their own prices.

Like many cities in the East, Vancouver is easily accessible to imports, either by sea for large volumes, or overland by truck from nearby Seattle. There is no easily discernible relationship between prices in Edmonton and Vancouver. Unlike in the rest of Western Canada, the Edmonton refiners are almost certainly price takers rather than price setters. While the overall average difference in prices of 1.07 cents/L is close to the current pipeline tariff of approximately 1.13 cents/L, this is a coincidence. During the first part of the period covered, from January 1998 until January 2001, the average difference was 1.64 cents/L and there were many months when the differential was far in excess of the pipeline tariff. The reverse is the case for the succeeding period, from January 2001 until May 2004, when the average differential is 0.57 cents/L, clearly well below the cost of transportation. These numbers suggest that it is highly unlikely that prices in Edmonton are set at a level to meet Vancouver prices and cover transportation costs. It is more likely that the benchmarks used in setting prices in Edmonton bear some relationship to the forces acting on Vancouver prices. And of course one common factor is the price of crude oil.

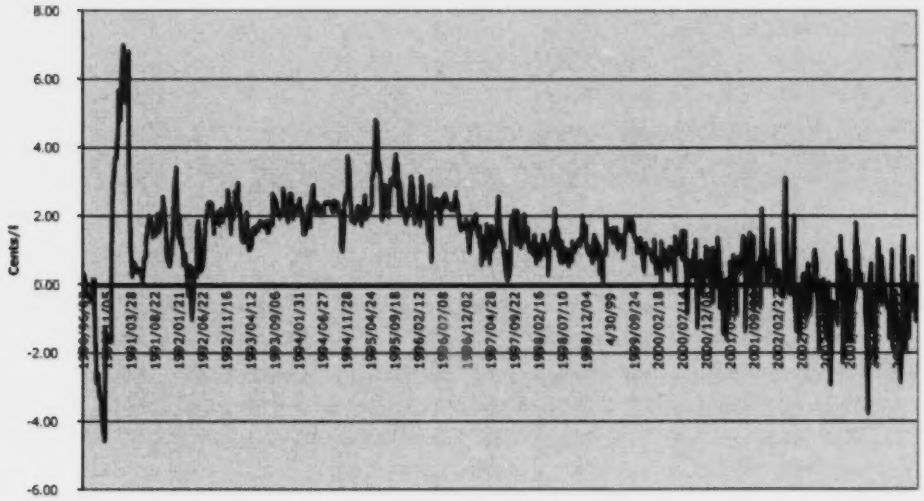
Pricing in Eastern Canada. Most regional centres in Eastern Canada are easily accessible by sea or the Great Lakes. In addition, many cities in Southern Ontario are within easy driving distance of either Buffalo or Detroit. Thus successive investigations of the pricing of wholesale gasoline have concluded that domestic refiners have limited pricing freedom.

But it is also important to look beyond locations where there are a number of domestic refiners within close proximity to each other that have a large volume of capacity to utilize. To this end the differential between Saint John and Halifax rack prices, respectively, were compared with those in Montreal. Montreal was chosen as providing a competitive Canadian benchmark since wholesale prices there have

[41] Some appreciation of the degree to which prices in Western Canada are related can be obtained by comparing the coefficient of variation for the differential in prices between points for which there is no product movement and the existence of price leadership is highly doubtful. Over a similar period to the price comparisons in Western Canada the coefficient of variation of the Saint John-Montreal price differential was 2.49, due to considerable variability and a relatively small average difference.

consistently and closely reflected the level of prices in the Atlantic Basin. The differentials for Saint John are shown in Chart 8. Differentials of the order of two cents/l in the early and middle 1990s represented very high refiner margins. But for reasons that are not immediately apparent, there has been a gradual shift towards more competitive price levels in both Halifax and Saint John for both gasoline and diesel, to the point that prices in both centres are, presently, somewhat below those in Montreal. It is noteworthy that there is a single refiner in both locations, Irving in Saint John and Imperial in Dartmouth. The existence and possibility of purchase/sale agreements did not provide a sufficient presence of other refiners to create a competitive outcome.

Chart 8: Rack Price Differential: Saint John-Montreal



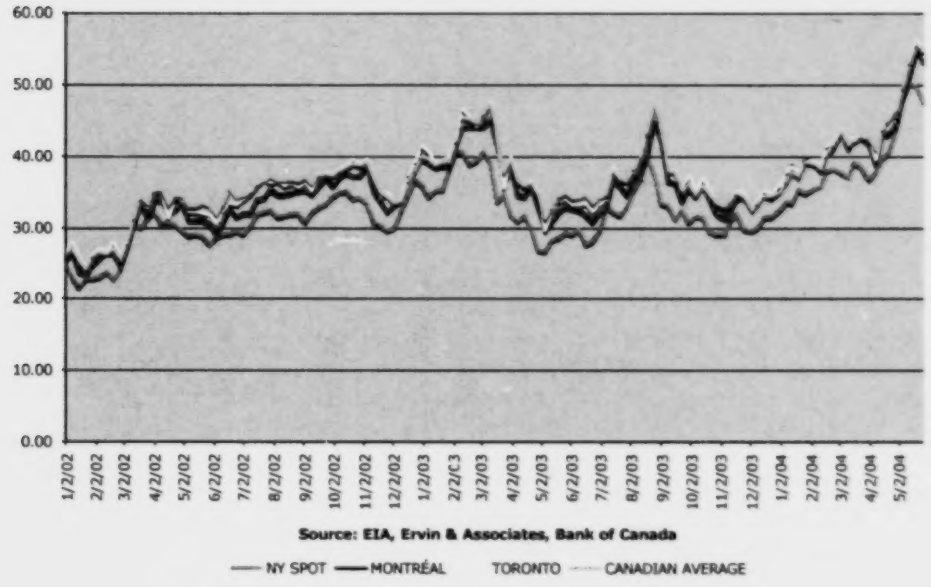
Conclusion: Relationship Between Canadian Rack Prices and U.S. Spot Prices. As is evident in Chart 9, rack prices in Canadian centres are aligned with spot prices in New York. Much of this close relationship is undoubtedly due to a strong common factor affecting all prices, namely changes in crude oil prices. Thus of greater interest than the timing of price changes is the differential between spot prices in New York and rack prices in Montreal and Toronto. These are more clearly seen in Chart 10, that traces these differentials.

The key consideration in both comparisons is that there was no widening in the differentials during 2004 generally, and none as well when prices peaked in May compared to average differentials since the beginning of 2002. In fact it is somewhat surprising that the differentials did not widen in 2004, since they are not immune to general market conditions as indicated by narrower differentials in 2002 when market conditions were less favourable for refiners than in the preceding and succeeding years. It is doubtful that the differential covered discounts off of rack prices and the terminal costs. In 2003 there

was probably some cushion. The average differential in cents per litre for Montreal[42] in 2002, 2003 and 2004, respectively, was: 2.36; 3.46 and 3.16. The pattern is similar for Toronto: 3.55; 4.73; and 3.78 cents per litre in 2002, 2003 and 2004, respectively. The pricing experience in these two cities is similar across the country. There was no spike in wholesale prices in 2004 that cannot be traced to increased crude costs and widening margins in the U.S. When the latter declined, so did wholesale prices in Canada to the extent of more than offsetting increasing prices for crude oil.

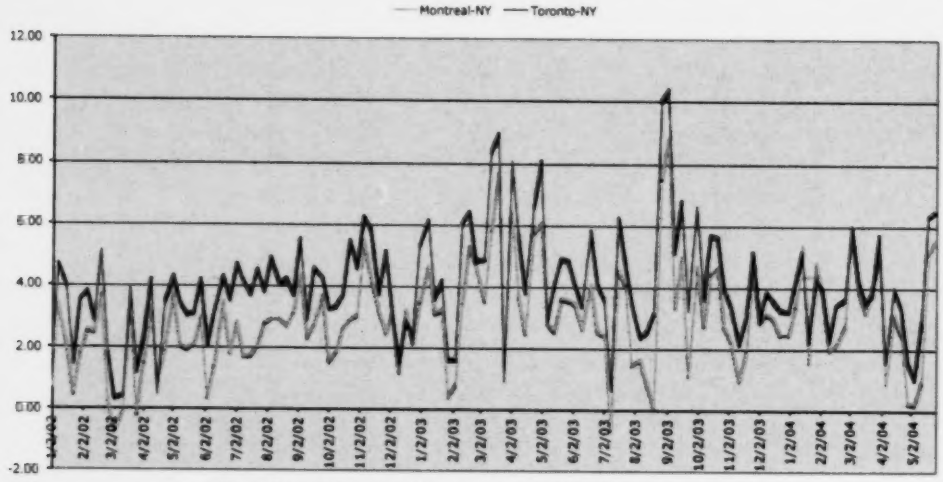
These data support the well-established conclusion in the industry that prices in Canada tend to closely track those in the U.S. This is not to say that divergences are not possible, but price movements of the magnitude that occurred in 2004 in Canada are inconceivable unless they are reflective of similar movements in the U.S. and supply sources in Europe and the Caribbean. In general price leaders in Canada anticipate the results that would occur under arbitrage so the product movements are not necessary for the tracking of prices to occur

Chart 9: Relation of Canadian Rack Prices to NY Spot Price



[42] Montreal has been used rather then Ottawa, even though the latter is a focus of interest, because Montreal is most directly affected by imports and the threat of imports. The rack price in Ottawa has been 0.52 cents/L higher than in Montreal over the last six years and declined somewhat in 2004.

Chart 10: Difference in Toronto, Montreal Rack and NY Spot



Source:Energy Information Administration, Ervin & Associates, Bank of Canada